Reporting Federal Activities . . .

Higher Education

Features for MAY 1960

Science and the Public

By G. B. KISTIAKOWSKY

National Defense Education Act: Progress at Midpoint

By PETER P. MUIRHEAD

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Office of Education

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Wider public understanding of science and technology is a growing condition for their development in America.

Science and the Public

By G. B. KISTIAKOWSKY *

A FEW CENTURIES ago, too recently even to involve any biological changes in the nature of man, there began a growth of civilization and a spread of culture at an unprecedented pace. Not accidentally has this period coincided with the growth of new knowledge and understanding and the advancement of experimental science from the small beginnings of the Renaissance to the major force of today.

Many centuries ago, Ponce de Leon sought the Fountain of Youth in Florida, expressing an urge as old as the race itself; but his aspirations were nothing but a dream until recent developments in medicine and physiology began to unfold. The problem then emerged of what to do with the "Fountain of Youth" when the reality of greatly extending the span of human life came upon us.

Recent successes of medical research in eradicating disease and prolonging life have contributed to an explosive growth of populations. But death from disease would be merely replaced by death from starvation were it not for chemistry, biology, and genetics—the applications of which have revolutionized the production of food. True, man does not live by bread alone, but how important to the human race are those stoics whose intellect must diet on sickness and starvation?

The rainmaker with his fireworks and cannon, or his invocations to the native gods, was a comic figure a few years ago. Now we have to take him seriously when he applies the discoveries of physical chemistry to modern meteorology.

Similarly, if cannibals ate the hearts of only men of courage—thereby to gain courage themselves—they might have acquired extra vitamins but they did not change their personalities, nor did they hand on to their descendants any altered characteristics. But the microbiologist of today is confident that he has close at hand the key to understanding heredity.

Such examples could be extended almost endlessly from one prospect to another to illustrate the growing impact of modern science and technology on our life and times without indulging in science fiction. But science fiction pales before the facts as

*Special Assistant to the President for Science and Technology, and chairman of the President's Science Advisory Committee, on leave as Abbott and James Lawrence Professor of Chemistry, Harvard University. Dr. Kistiakowsky holds the Ph. D. degree from the University of Berlin. The author of some 150 journal articles and one book, he has done research largely in the fields of kinetics of gas phase reactions, structure of polyatomic molecules, thermochemistry of organic compounds, enzyme catalyzed reactions, detonation waves, and explosives. During 1940–44 he advanced from member of the National Defense Research Committee to director of its Explosives Research Laboratory and then served as chief of the Explosives Division of the Los Alamos Laboratory, 1944–45, in which capacity he was a key member of the team that developed the atomic bomb in World War II. Dr. Kistiakowsky has received numerous citations and awards. Among these are the Medal for Merit, Army Ordnance Award, Navy Ordnance Development Award, Nichols Medal (New York Section of the American Chemical Society), the King's Medal for Services in the Cause of Freedom (United Kingdom), USAF Exceptional Services Award, and the Priestley Award (Dickinson College), plus honorary D. Sc. degrees from Harvard University (1955), Williams College (1958), Oxford (1959), and the University of Pennsylvania (1960).

they develop and serves to confuse and inhibit the broad public understanding of science and technology necessary to their development in a democracy.

Confusing Science With Technology

For some time I have been troubled and disturbed by the continuing public failure to appreciate the distinction as well as the affinity between science and technology, by our national inability to recognize the uniqueness of each as well as the value of both. Science, being the understanding of man and the world in which he lives, has revolutionized man's thinking about his way of life. On the other hand technology, as the application of knowledge to man's goals and needs, has provided an expanding material basis for human dignity and provided the time and leisure for intellectual and cultural growth.

While it may be said that scientific research enriches our understanding and technology our material welfare, all too frequently is basic science seen as a less useful, long-hairish appendage of technology, and technology as both the discovery of new knowledge and its use. When this misconception becomes ingrained, then as night follows day, both science and technology suffer.

Consider for a moment some facts about technological developments, selected almost at random from various fields which illustrate their valid relationship. The history of modern development of nuclear power, for example, stems directly from Fermi's experiments on the reactions of neutrons with heavy atomic nuclei, which were a part of abstract research in nuclear physics during the late 30's. The television industry had its beginnings in basic research on thermionic emission and in abstract studies of the photoelectric effect. In 1905, Einstein gave the first rational explanation of this effect, laying down the foundation for modern television. Transistors and the resulting revolution in the electronics industry had their beginnings in the studies of crystal imperfections and electric conduction in crystals less than 50 years ago. Almost the whole of our modern petroleum industry derives from basic studies of catalysis made by such men as Sabatier, Ipatieff, Haber, and Taylor. The same derivation applies to bulk chemicals like ammonia, methyl alcohol, sulphuric acid, and the industries that produce them.

Almost any industrial process today, excepting such basic operations as the smelting of common metals, can be traced to scientific experiments conducted within the last century by scientists who were little concerned with practical applications and who seldom benefited personally from their achievements. And although we can have science without technology, as we did from the early beginnings of the experimental sciences in the 17th century until nearly the middle of the 19th century when the Industrial Revolution began to make itself felt, we cannot have a growing technology without science.

To stress the differences between science and technology is not to impute a higher value to one or the other. Each is necessary to our society. But we cannot hope to devise an adequate technology in a hurry without first having a sound foundation of basic science on which to build it. Evidence of this cause-and-effect relationship can be found at every turn. It poses a sober question: If we outrun the sources of basic research in science on which all new developments must depend, where are we to find the imaginative scientific thought upon which to build the technology of tomorrow?

Importing science from abroad

Thirty or forty years ago our already substantial and expanding technology leaned very heavily on fundamental research results imported from abroad. Countries like Germany and England were then the leaders in basic research, and only a few isolated centers were to be found in the United States. The explosive growth of technological demands produced by World War II focused attention in this country on the need for our own sources of basic knowledge essential to the technical progress on which our very survival might depend. Today, science is still international in scope and scientific information is exchanged across national boundaries, but no longer can we rely on German or English basic science if our own technology outruns the supply.

Because science has played a prominent role in America's intellectual growth only in recent decades, it has not had the conscious public recognition that it has long enjoyed in Europe. Scholarly activity abroad has long been recognized and appreciated as an admirable occupation. In America the role of science is less sharply defined. One reason for this is that we have had less time. Historically, we have been preoccupied with building

and developing a great nation, solidly knitting it together with technological triumphs of communication and transportation. If we consider science as the pursuit of knowledge, with no purpose but the expansion, clarification, and correlation of man's knowledge of himself and his environment, we must admit that the scientific tradition in America has less of a history than our technological tradition. But we also must admit that the freedom from a desperate struggle for existence that technology has given us has likewise provided opportunities for cultural development of which the pursuit of excellence in science is an integral and important part.

The two roles of science and technology, then, are not only distinct, but clearly interdependent, and it would be unwise to emphasize one at the expense of the other.

Clarification needed

Many of our most talented young people have not been attracted to science because there was no clear image in their minds of the functions of a scientist. Even where a relatively clear image of science did exist, there was apt to be a considerably fogged image of a scientist. A survey conducted a few years ago showed that the scientist was considered to be, in the parlance of the young, a "square," not adequately compensated, not able to live a normal life that included proper recreational and cultural opportunities, and possibly not even loyal to his country. Hopefully, this picture is changing and will change more. But equating "square" with "egghead" is still far too prevalent, and cannot but harm our future.

One can but conclude that the education of our people has not kept abreast of the rapid developments in science and technology and that scientists themselves must take the lead in correcting this deficiency. The formation of the Physical Science Study Committee at Massachusetts Institute of Technology is one example of what can be done. Professor Zacharias and his group of distinguished colleagues have set out to develop a curriculum that would make physical science interesting and understandable to the secondary school student, not with the primary objective of creating scientists, but to develop mature citizens with an understanding of the scientific world around them. The movement is accelerating, into chemistry, mathematics, and the biological sciences. It may be that in a few years, we will see a marked difference in public understanding because of these dramatic developments in the teaching of science.

It is important to both the scientist and the engineer that the terms be clarified, for if youth is confused about science and technology, so are the parents of youth who influence political decisions which can greatly alter the course of scientific and engineering progress.

Reappraisal underway

A beneficial effect of Sputnik I was to make us, as a Nation, aware that we could not afford to be complacent about our science and technology. The resulting reappraisals of the methods and objectives of our education which underpin all our endeavors have been valuable. We are moving forward and are moving effectively, but it is too early to be satisfied with the results. We still face a crucial challenge on the intellectual front. We are sorely in need of a greater devotion to learning, a greater pride in intellectual achievement, a greater appreciation of excellence in general throughout our national life. And we must keep in mind that in our society science has a central role to play in intellectual creation and in the generation of basic ideas. When new concepts and ideas cease to flow, the very wellsprings of technology and engineering run dry.

The real effort to achieve excellence in science and in all activities of the life and mind is, indeed, a national one and extends to all communities and individuals throughout the United States. The Federal Government has taken major steps to improve its own abilities to guide and assist, but again, the success of these efforts by government depends on the people it serves.

Recent Efforts by the Federal Government

Federal activities received an important new impetus with the President's speeches to the Nation in November 1957, when he called for a manifold effort to insure the mobilization of the best resources of science and scientists in support of the national security and welfare. He particularly stressed education in science and basic research. It was during the first of these speeches that he announced the creation of the office it is my privilege to hold, and named as the incumbent my illustrious predecessor and friend, James R. Killian, Jr. At the same time,

the President's Science Advisory Committee was reconstituted in the White House Office.

Specifications

The President's speeches outlined to the Nation the background against which a number of specific actions have since taken place. These included some reorganization of the Federal Government. The Department of Defense, for example, now has a Director of Defense Research and Engineering, Herbert York, who has pulled together an able team to evaluate and direct the progress and development of our weapons technology and defense systems engineering. In addition, each of the three Services has brought the talents of scientists and engineers to policymaking levels.

The Nation's space program was reevaluated and its civil aspects placed under the new National Aeronautics and Space Administration, with T. Keith Glennan as Administrator.

Of great importance was the passage of the National Defense Education Act which, though designed to strengthen education generally, established the legal basis for specific actions to strengthen science education. At the same time the National Science Foundation was given a threefold increase in appropriations for support of its programs for basic research and education in the sciences. The effect of these two major actions will not be immediately visible, but they are among the most important. These programs are directed primarily at the very base of our scientific structure—the education of young talent, the support of graduate and postdoctoral work by individuals, the many-pronged support of basic research, and the strengthening of our educational institutions.

Acting on recommendation of his Science Advisory Committee, the President established by Executive order a Federal Council for Science and Technology to advise the Cabinet on those aspects of the Government's program that require interdepartmental and Government-wide coordination. Membership on the Council comprises officials, at the policymaking level, of the departments and agencies that have substantial research activities. The Council is chaired by the Special Assistant for Science and Technology and hence has close ties with the President's Science Advisory Committee. It is actively engaged in studies of important Federal policy problems affecting technological progress.

Presidential advisers

Neither the President's Science Advisory Committee nor my office engages in operations or decides policy. We have neither responsibility nor authority for executive decisions. Our function is to provide answers to questions raised by the President and to undertake special assignments for him of an advisory kind. We provide advice on the policy matters relating to science and technology, just as other parts of the White House Office advise on budgetary, political, economic, security, and other matters.

The major part of the work of the Committee is carried on by panels that include both Committee members and other scientists and engineers selected for special competence in the various fields of inquiry. Some panels have standing assignments, while others are created for special one-time problems. Committee membership carries with it a heavy load of work. Over 100 scientists and engineers have participated in panel activities. And their participation is essential because the Special Assistant alone could not presume to advise on all of science and technology or to provide expert advice in fields that range through the alphabet, from aircraft to zoology.

The substantive work of the President's Science Advisory Committee has covered a wide range of problems and activities where science and technology impinge on our national life.

Panel reports

In the winter of 1957–58, for example, the Panel on Space Science suggested the elements of a program in space science that subsequently served as a basis for the Administration's proposal for the organization of the National Aeronautics and Space Administration. The Panel prepared a public statement, "Introduction to Outer Space," published under the imprint of the White House, which has had a circulation running into many millions.

Similarly, the report of the Panel on Scientific Information dealt with the problem of how the rapidly growing volume of scientific and technical information could best be organized to meet the needs of scientists and engineers. The panel concluded that the United States should not follow the Soviet pattern of establishing a centralized information center but should seek instead to coordinate the existing programs of both Government agencies and

private institutions. The President accepted the Committee's recommendations and directed the National Science Foundation to take the leadership in bringing about effective coordination of the various scientific information activities within the Federal Government.

Another report, resulting from the deliberations of the Panel on Research Policy and entitled "Strengthening American Science," examined the role of the Federal Government in research and development. The President subsequently signed an Executive order implementing one of the principal recommendations of the report and so established the Federal Council for Science and Technology, to which I have already referred.

A panel appointed by the President's Science Advisory Committee and the General Advisory Committee to the Atomic Energy Commission prepared a report on high energy accelerators, which was accompanied by a little primer on elementary particle physics, designed to help the public understand the need for elaborate and expensive research tools in this field of science. The report recommended that construction be started on the 2-mile long linear accelerator at Stanford, and the President recommended appropriate legislation to the Congress.

Because our emergence as the leader of the free world enhanced the importance of the interrelationships between science and foreign policy, the Panel on Science and Technology in Foreign Affairs was established as a source of advice and information in this area. The panel also works to further international cooperation in science and technology.

The Committee's Panel on Science and Engineering Education approached this broad question from the standpoint of how our intellectual standards, as well as our educational methods and techniques, can be raised and improved to meet the complex needs of a technological society. Its recent report issued by the White House is entitled "Education for the Age of Science." The interest and attention it received suggest that there is a growing public appreciation of these problems.

Another type of Committee responsibility involves the technical evaluation of projects or programs—many of them in the military field—on which there has been technical controversy. In dealing with these problems, the Committee recruits the most competent advisers available and lets them study these problems in an atmosphere free from personal or departmental positions. In these situations, the Committee seeks to set forth the facts and to list the possible alternative solutions.

THEME OF AMERICAN EDUCATION WEEK, 1960

"Strengthen Schools for the 60's"

November 6–12

Sunday, Nov. 6	Serious Students—Stronger Schools
Monday, Nov. 7	Interested Parents—Stronger Schools
Tuesday, Nov. 8	Able Board Members—Stronger Schools
Wednesday, Nov. 9	Quality Teachers—Stronger Schools
Thursday, Nov. 10	Ample Funds—Stronger Schools
Friday, Nov. 11	Challenging Curriculums—Stronger Schools
Saturday, Nov. 12	Lifelong Learners—Stronger Schools

The imperative of public understanding

In spite of the wide-ranging Federal activities in the development of science and technology in America, the role of the Federal Government is essentially one of support to the Nation's scientific effort. The primary responsibility for developing our capabilities on a broad front—and the key to success—rests not only upon the individuals, organizations, institutes, and industries conducting scientific and technical activities, but upon the public support and understanding that these activities enlist.

The national attention now focused on science and technology provides a precious opportunity for all those concerned with their health and vigor to nourish a wider understanding of their true rewards and relationships. Science and technology are among our most creative national resources. How important we consider them, how we place them in our national scheme of things, how we foster them, how well we relate them to our educational and other institutions—these considerations will have a profound effect on the maintenance of our world leadership and on national survival as well.

National Defense Education Act Progress at Midpoint

By PETER P. MUIRHEAD*

WE ARE almost at midpoint in the life of the National Defense Education Act. Twenty months of program development and initial experience lie behind us, and ahead of us we have a little over 2 more years in which to attempt to reach the goals defined in the act. It is of course too early to gauge with accuracy the impact of NDEA programs on higher education, but certain developments may offer some measure of the effectiveness of these Federal programs in assisting and stimulating the Nation's education efforts.

In bare outline, this is what will result from the expenditure of $113.7 million which the Congress has thus far appropriated for the four higher education programs:

- About 150,000 loans totaling $76 million will have been made or committed to college students by 1,360 participating colleges and universities.
- 2,500 3-year fellowships have been awarded to graduate students preparing for college teaching careers, and 474 graduate programs at 138 graduate schools will have been newly established or expanded.
- About 6,500 secondary school counselors will have received professional training at 161 counseling and guidance training institutes.
- $6.5 million will have been expended on research and studies contracts for the development of instructional materials for the teaching of modern foreign languages in the elementary and secondary schools and in colleges and universities.
- Some 3,000 elementary and secondary school teachers will have received professional training at 58 modern foreign language institutes.
- 46 language and area centers for the improvement of instruction in languages not commonly taught in the U.S. will have been established.
- Modern foreign language fellowships will have been awarded to 532 graduate students preparing to teach languages in college or to use their language competencies in some other area of public service.

These statistical tabulations point to very real achievements during the brief life of the act, but some benefits of these programs go beyond such a simple tabulation. Some were not planned or expected.

Perhaps the most important result of the student loan program—other than, of course, the thousands of students it has benefited—has been its contribution to an almost revolutionary change in attitude toward the use of loans in helping students to meet the costs of higher education. About 83,000 students borrowed $13.4 million to help finance their education in 1955–56. This year four times that amount will be loaned to about 100,000 students under NDEA alone.

Undoubtedly the liberal terms of the student loan program, as well as the fact that it has been well publicized, have had something to do with the change in attitude. But of perhaps greater significance in explaining the great increase in loan activity throughout the country has been the spectacular and almost universal acceptance of the program by the colleges and universities. Their acceptance has provided higher education opportunities to thousands of students for the first time. Over 500 of the 1,360 institutions participating in the program never

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had loan funds on their campuses before, and institutions which had them but made limited use of them are now finding a ready willingness among present and prospective students to accept loans under "learn and pay later" terms suited to their student status.

Contrary to what might have been expected when the act was first passed, the student loan program has not had the effect of drying up other sources of student loans. Rather it has stimulated non-Federal loan activity. For example, both the Massachusetts Higher Education Assistance Corporation and the New York Higher Education Assistance Corporation—two of the largest State loan programs—made more loans to college students this year than last. And a number of institutions now participating in the program have established additional loan programs of their own to meet the heavy demands by their students for financial help. Several of these—the University of Virginia and Ripon College are examples—have established loan funds with liberal terms similar to those of the Federal program.

Besides the very significant change in attitude toward using credit as a means of helping to finance a student's higher education and the increase in loan activity, there is evidence to indicate that the program is encouraging a change in the approach of many colleges and universities to student financial assistance. It is a change that can perhaps be characterized as the "umbrella" approach, that is, bringing all the institution's student financial aid resources—loans, scholarships, grants-in-aid, work opportunities—to bear on the problem of meeting the particular needs of each financially needy student. Such an approach, used with careful assessment of financial need, offers considerable promise of achieving the optimum use of student loan funds.

But perhaps the most important development has been the manner in which colleges and secondary schools have combined their counseling talents and utilized the program to encourage additional numbers of able but needy high school seniors to continue with their higher education. This development is truly in the spirit of a program designed to give assurance that no student of ability will be denied an opportunity for higher education because of financial need.

Perhaps the most intriguing of the higher education programs provided by the act is language development (Title VI). It is a difficult program to explain. In the first place it is an ambitious effort which attempts to do a great many very important things in the language teaching field. It is concerned not only with the languages commonly taught in U.S. schools, such as French, German, and Spanish, but with the languages rarely taught, such as Arabic, Chinese, Hindustani, Japanese, Portuguese, and Russian. The problems of improving instruction in these language areas are not the same. Moreover, the program is really four programs: Language institutes for elementary and secondary school teachers of the commonly taught languages; language and area centers for the expansion of instructional facilities in the rarely taught languages; modern foreign language fellowships in the rarely taught languages; and language research and studies in both the commonly taught and rarely taught languages. These four programs cut across all levels of instruction, from the elementary to graduate education.

The language institutes are designed to improve high school language instruction. The response to this effort by the language teachers themselves has been impressive. Nearly 10,000 language teachers have applied to attend an institute next summer, although places are available for only 2,040. Last summer 5,000 teachers applied for only 930 places.

Instruction provided at the institutes emphasizes what James Bryant Conant, who is serving on our Advisory Committee for Language Development, has called the "American Approach" to language learning; that is to say, emphasizing the speaking and understanding aspects of language learning. This American approach to language instruction is heavily emphasized at the institutes. By the end of this next summer's program, over 2,000 language teachers, in addition to the 930 teachers who attended institutes last summer, will have had the opportunity to increase their language skills through this new approach, and in the fall thousands of students will have the direct benefit of that training.

The American approach to language learning is also getting a very large assist from the language research program. We have, for example, just completed a $1 million contract with the Glastonbury (Conn.) Public Schools for the development of instructional materials in French, German, Italian, Spanish, and Russian, which will emphasize effective teaching of spoken languages. It is the largest

project of its kind ever undertaken in this country. By 1962 a complete set of instructional materials—including student workbooks, manuals of instruction for teachers, magnetic tape recordings for use in language laboratories and audio-lingual homework disk recordings for students—will be ready for use in the 7th through the 12th grades. Some of these materials will be prepared in time for the 37 institutes to be conducted this summer, and over the next 2 years other materials will be available at intervals.

As to the lack of adequate instructional materials in the rarely taught languages, the problem is so vast, the work to be done so great, that we can expect no solution for a number of years. In many areas we are starting from scratch. For example, over 150 million people residing below the Sahara speak African languages. But we have no dictionaries, no workbooks, no grammars, no readers, no tapes in most of the African languages, and for such important languages as Swahili and Yoruba, the instructional languages are wholly inadequate. Within the limits of the resources available to us, we have launched a series of projects in African languages which will go a long way toward doing something substantial in this badly neglected field.

About $3 million is now being spent or has been spent on research projects in the critical languages—particularly in languages spoken in the Near and Middle East, Far East, and South and Southeast Asia. In addition, we are providing funds for the expansion of faculty and facilities in 1960–61 at 46 language and area centers where these critical languages are being taught. Nineteen of these centers are already in operation and are to be supported again next year. In all, we have awarded 532 modern foreign language fellowships for study of Arabic, Chinese, Hindustani, Japanese, Portuguese, and Russian—languages designated by the Commissioner as requiring primary emphasis to meet critical needs of the Government, business, industry, and education. Of these, 171 were for study in 1959–60 and 474 for study in 1960–61. Of the latter, 113 were second-year fellowships.

The most fascinating aspect of these four language programs is the promise they hold out for the complete reconstruction of language teaching throughout the country, on all levels of education. Already the impact on language instruction is being felt. But the long-lasting benefits to flow from these programs must necessarily be realized over a period of years, not of months. What is encouraging is that after many years of public apathy, substantial progress is being made, and there is the assurance that the problems these programs are designed to meet are clearly on their way to being solved.

Long-range results are also characteristic of the graduate fellowship program (Title IV). Thus far 2,500 fellowships have been awarded, 1,500 of them for study beginning next fall. But it will not be until September 1962, at the very earliest, that the first students preparing for college teaching with Title IV fellowships will be ready to begin their teaching careers. The immediate value of the program comes from persuading students to begin preparation for college teaching who may not otherwise have done so if they had not had the assurance of financial support for 3 years of graduate work.

Because the focus of the program is on assisting the graduate student to prepare for college teaching, it is often forgotten that about half of the funds appropriated for the program go to the graduate school to help defray costs of the new or expanded graduate program in which the student is studying. In concrete terms a new or expanded program involves hiring additional faculty members, buying new laboratory equipment, expanding library facilities, and so on. Institutions participating will receive about $6,250,000 to help them expand their programs in 1959–60 and 1960–61, and this expansion will inevitably permit the graduate schools to accommodate even more graduate students in their doctoral programs.

The effect upon a university—and for that matter the community and State as well—may be difficult to measure, but obviously strengthened graduate programs generate a whole range of activities which reach down to the undergraduate school, out into the community, and to the high schools. Students who may not otherwise have gone into, let us say, engineering are now encouraged to do so because of the availability of an engineering program which previously had been either nonexistent or relatively weak.

In providing for the counseling and guidance institutes program, the Congress demonstrated a national concern for the talented student. For many years now we have had study after study demonstrating that an unusually high number of able high school students fail to continue their education

beyond graduation. Scholarships and loans have been one answer, but they do not solve the problem of the able student who does not go on to college because he has not been given an understanding of its value or a realization of the special contribution he can make to society.

The institutes program is designed to help prevent this waste of talent by improving the professional qualifications of secondary school counselors and of teachers preparing to be counselors, particularly helping them acquire a better understanding of able students and how to work effectively with them. The program does not attempt, however, to provide a comprehensive counselor education for individual counselors. It assumes that those enrolled, particularly in short-term institutes, have had some counseling preparation and experience.

Perhaps the most significant contribution the institutes can make is to bring about a shift in emphasis in counseling programs of the schools. Many counselors have, of necessity, been occupied primarily with the "problem child," the delinquent, the student of average or below average ability with little interest in school. This has been a vital function, but in the process the talented youngster has often not received the attention he deserves and needs. As a consequence, too many of these students fail to capitalize on their special abilities. The institutes are encouraging counselors to widen their responsibilities to include able students as well as those who appear to be in difficulty. One of the most successful features of the institutes has been what is called "practicum training," in which the enrollee actually counsels talented youngsters under professional supervision. This highly practical experience in counseling is backed by lectures by the Nation's leading counseling experts and by seminars in which the special problems of counseling the able student are studied.

These four programs concerning higher education are not a comprehensive, systematic attack on the problems of education facing the Nation; rather they are vigorous thrusts toward solutions of specific problems—helping qualified but needy students to continue their education, strengthening the graduate schools to train more college teachers, improving the counseling services in the high schools to prevent further loss of talent, and improving foreign language instruction at all levels of education.

As these programs continue to be developed over the next 2 years, we shall be able to report further on the progress being made. I am confident there will continue to be a great number of solid achievements. But for the achievements that matter, those that are to have a long lasting effect on our education system, we will have to wait for a while. The broader aims of these programs—the strengthening of the educational system by improving educational opportunities and instruction—will not be fully realized for some years to come. The investment, since it is in education, must look to long-term results. The National Defense Education Act is, in the most significant sense of the words, an investment in the future.

Office of Education Studies and Surveys

Survey of Graduate Schools

A STUDY of graduate schools entitled Survey of Fellowship and Other Information Relevant to Doctoral Programs in American Universities, 1959–60, has been completed.

The survey utilized a 14-page questionnaire, in 4 parts, which was sent to the graduate deans of 156 universities offering doctoral programs in liberal arts and natural sciences. Questionnaires were mailed in October 1959 and as of the following mid-April, 141 replies had been received. Of those institutions which did not return questionnaires, only four awarded a sizable number of doctorates last year.

Part I of the survey asked the universities to report the number and the value of graduate fellowships awarded in the present academic year in some 60 different departments or fields and to report tuition fellowships and other university fellowships separately.

Part II of the survey asked for the number and value of fellowships awarded in the same 60 fields

from all levels of government. They were also asked to report "major" fellowships—defined as those amounting to $500 or more—from private foundations.

Part III of the survey asked the deans for two different kinds of information: for the number of additional doctoral candidates they could accept with their present faculties and facilities without lowering the quality of their graduate training; and for the number of doctoral candidates who completed all requirements for the doctorate except the dissertation at least 3 years ago they would be willing to recommend for a 1-year fellowship so that the students could finish their dissertations.

As one would expect, data submitted in reply to questions on both capacity and "ABD's" (all but the dissertation) vary widely by field and by institution. The range in capacity, by field, was from 17 to 1,415, and by institution, from 0 to 1,000. The range for ABD's by field was from 2 to 103, and by institution, from 0 to 221. Internal evidence strongly suggests that these figures must be interpreted with caution and with an understanding of the situation in individual institutions.

Part IV of the survey asked for the deans' rating on the seriousness of barriers to further expansion of their graduate schools. In all academic fields, the most serious barrier was felt to be the lack of financial support for graduate students.

A complete report of the survey is now in preparation and should be available by October.

The survey was a project of the Graduate Fellowship Section in the Financial Aid Branch of the Division of Higher Education. The study was designed and carried out by John L. Chase, then specialist for fellowships (now specialist for the social sciences), under the general direction of the section chief, Henry E. Bent.

Scientific Research Increased

U.S. colleges and universities increased their scientific research and development expenditures by 80 percent between 1954 and 1958, a National Science Foundation study shows. Preliminary results of the study were issued on April 26 in *Reviews of Data on Research and Development*, No. 19, "Funds for Research and Development in Colleges and Universities, Fiscal Year 1958."

Expenditures reflected in the study are those for separately budgeted or "earmarked" funds. They increased from $409.7 million in 1954 to $735.8 million in 1958.

The study shows that in 1958 more than half the total expenditure, $408.3 million, was spent by agricultural experiment stations and Federal contract research centers administered by educational institutions, and the remaining $327.5 million by the colleges and universities proper. Colleges and universities spent 74 percent of their funds for basic rather than applied research; experiment stations and contract centers spent 35 percent and 24 percent, respectively, for basic research.

Expenditures reported for colleges and universities proper—excluding experiment stations and contract centers—were: Life sciences, $139.5 million; physical sciences, $98.6 million; engineering, $66.1 million; and social sciences, $23.3 million.

Comparisons with a 1953–54 study show that Federal expenditures for research and development in colleges and universities proper increased by 55 percent between 1954 and 1958—from $140.7 million to $217.9 million. Total indirect cost, or overhead, for conducting current research was found to be 28 percent of the direct costs.

These statistics were collected by the U.S. Department of Health, Education, and Welfare, Office of Education, under contract with the National Science Foundation.

For complete copies available of *Reviews of Data on Research and Development*, No. 19, see New Publications, page 19.

Cooperative Research Summary

THE SUMMARY below provides an indication of the accomplishments of the Cooperative Research Program from July 1, 1956, to April 2, 1960.

Proposals received	1,088
Proposals recommended to the Commissioner by the Advisory Committee	[1] 271
Projects signed into contract	253
Projects completed	60
Total Federal funds obligated to bring 253 projects to completion	[2] $11,147,937

[1] Includes the 18 projects which were approved in March but which have not yet been signed into contract.

[2] Funds for projects continuing beyond the current fiscal year are included but are contingent on congressional appropriations of funds for the subsequent fiscal years.

17 New Research Projects

The following research projects have been contracted as a result of the proposals recommended for approval by the Research Advisory Committee at the November 3, 1959, meeting:

The Use of Mathematical Programing to Solve Certain Problems in Public School Transportation; University of Mississippi, Roscoe A. Boyer.

Why Successful Students of the Natural Sciences Abandon Careers in Science; Brooklyn College, Edgar Z. Friedenberg and Carl Nordstrom.

Experimental Designs to Minimize Halo Effects in Rating and Maximize Independence of Traits, and New Statistical Procedures to Correct Biases of Raters; University of Wisconsin, Julian C. Stanley, Jr.

Effects of Motivational Factors on Perceptual-Cognitive Proficiency of Children Who Vary in Intellectual Level; Purdue University, Charles D. Smock.

Effectiveness and Efficiency of Problem Solving Laboratory Groups and Classroom Groups as Functions of Selected Individual and Group Variables; Washington University, Bryce B. Hudgins and Louis M. Smith.

The Measurement of Curiosity in Elementary School Children; University of Delaware, Wallace H. Maw.

Revenue Sources for the Support of Public Education; Stanford University, H. Thomas James.

Personality Correlates of Academic Adjustments; State University of Iowa, Leonard D. Goodstein.

Parents' Education and Income and the Education of Their Children; University of Michigan, James N. Morgan.

Interpersonal Perception: The Effect of Training in Perceptual Theory, Observation, and Analysis of Behavior upon Accuracy of Prediction of Children's Self-Reports; University of Florida, Ira J. Gordon.

The Relationship of Child Perceptions to Achievement and Behavior in the Early School Years; University of Florida, Arthur W. Combs.

Systematic Observation of Verbal Interaction as a Method of Comparing Mathematics Lessons; Washington University, E. Muriel J. Wright.

The Identification of Kindergarten Children Least Likely to Show Spontaneous Improvement in Speech-Sound Articulation; University of Minnesota, Mildred C. Templin.

Inductive Concept Formation in Normal and Retarded Subjects; Texas Christian University, C. B. Elam

Relationship of Self-Images to Achievement in Junior High School Subjects; Michigan State University, Wilbur B. Brookover.

A Comprehensive Study of the Motivational Factors Underlying Achievement of Eleventh Grade High School Students; Michigan State University, William W. Farquhar.

Research on the Characteristics of Effective College Teaching; University of Michigan, Wilbert McKeachie.

Attention Librarians

IF your files of ***Higher Education*** are incomplete for the period 1949–55, here is your chance to fill in. For a limited time, college and university library requests for back issues in volumes I through XII (needed to complete files) will be filled without charge. Full sets for the years named (and in volumes XIII–XVI) will be provided to libraries of colleges started in the last few years, to the extent made possible by existing stocks of back issues. ***School Life***, too, has small stocks of back numbers. They reach as far back as volume 30, 1947–48.

Free copies of both publications are available to librarians on request from Publications Inquiry Unit, Office of Education, U.S. Department of Health, Education, and Welfare, Washington 25, D.C.

Deadline Dates

September 1, 1960, is the next deadline date for submitting research proposals. Those postmarked on or before this date will be evaluated by the Research Advisory Committee within 60 to 90 days after the deadline. The subsequent deadline date for the receipt of proposals will be December 1, 1960.

The Office received 163 research proposals before its April 1 deadline. The Committee will make final recommendations on these proposals to the Commissioner after its next meeting, May 27–28, 1960.

Research Monographs

The Cooperative Research Program is preparing for publication a series of monographs based primarily on research supported by the program. The monographs will be of two types: (1) A basic series reporting on one research project; and (2) a supplemental series drawing together two or more research projects that focus on a particular problem.

Two monographs are now in their final stages and will be available in printed form in approximately 4 months. The first one, entitled *Motor Characteristics of the Mentally Retarded*, reports on a Cooperative Research project conducted by R. J. Francis and G. L. Rarick of the University of Wisconsin. The second monograph, *The Gifted Child*, reports four research projects. The contributing authors are F. B. Davis and G. S. Lesser of Hunter College; J. W. Getzels and P. W. Jackson of the University of

Chicago; P. H. Bowman and J. V. Pierce of the University of Chicago; and D. B. Orr of the University of Pittsburgh.

The Office is preparing four additional monographs at the present time, and plans approximately 12 more during the next fiscal year.

The criteria for selection are:

1. The research findings have potential value for education on a nationwide basis.
2. The problem with which the research dealt is currently of major importance.
3. The research findings have direct value for the educator as well as for the researcher.

Final Reports Being Disseminated

Final reports of Cooperative Research projects are being distributed to depository libraries of the Documents Expediting Project of the Library of Congress. Sixty-five copies are made available for institutional and public depository libraries throughout the Nation. Only the most recently completed research projects have been distributed to these libraries, but a serious effort is being made to make copies of all Cooperative Research projects available through the interlibrary loan system.

Final reports are also being made available to the National Education Association library.

NDEA Notes

Media Grants Announced

The Office of Education has made 17 grants, at a total cost of slightly more than $1 million, to colleges, universities, and specialized nonprofit organizations for study of the effective use in education of such new media as television, radio, motion pictures, and tape recorders. To date, 83 grants have been awarded under Title VII of the National Defense Education Act.

The grants are listed below by institution, purpose, length, director of the study, and amount.

Florida State University, Tallahassee: *Administering tests by television*, 18 months, H. A. Curtis, head, department of research and testing, and R. P. Kropp, associate professor. $39,653.

Stanford University, Palo Alto: *Use of television to improve teaching of Spanish in elementary grades*, 4 years, Kenneth E. Oberholtzer, superintendent, Denver, Colo., public schools, and Wilbur Schramm, director of the Institute of Communication Research. $320,622.

Ohio University, Athens: *Use of program analyzers and filmed recordings to train television teachers*. 15 months, F. Craig Johnson, director, instructional television research. $34,439.

University of Texas, Austin: *Effectiveness of television for inservice instruction to teachers*, 19 months, M. Vere DeVault, associate professor of elementary education. $64,905.

The American Institute for Research, Pittsburgh: *New uses for teaching machines*, 18 months, David J. Klaus, research scientist. $63,940.

Florence State College, Florence: *Use of television to reduce adult illiteracy*, 13 months, Nell Peerson. $66,205.

Indiana University Medical Center, Indianapolis: *Study to determine amount of repetition necessary to master material presented by teaching machines*, 1 year, C. B. Ferster, assistant professor, department of psychiatry. $9,200.

University of Arizona, Tucson: *Study to determine extent to which the visual portion of a sound motion picture film effects the verbal message*, 30 months, Carl H. Ketcham, assistant professor of English. $10,551.

Queens College, Flushing, N.Y.: *Improvement of individual instruction in ninth grade algebra*, 2 years, Gladys Crosby, assistant professor, education department. $30,795.

University of California, Berkeley: *Communicating with school children of subnormal intelligence by the use of motion pictures*, 18 months, John P. Driscoll, assistant professor of theater arts. $11,673.

Trenton State College, Trenton: *Use of self-instructional devices to teach mentally retarded primary*

school children, 3 years, Leonard S. Blackman, director of research, at the Edward R. Johnstone Training and Research Center, Bordentown, N.J., and Marshal P. Smith, chairman of the psychology department, Trenton State College. $154,654.

UNIVERSITY OF FLORIDA, Gainesville: *Effectiveness of photographic media in the modification of children's classroom behavior and self-concepts*, 2 years, Charles A. Cate, director, audiovisual center; Myron Cunningham, and Theodore Landsman, both professors of education. $38,561.

SOUTHERN ILLINOIS UNIVERSITY, Carbondale: *Use of teaching machines to help university freshmen use their university libraries more effectively*, 18 months, Paul R. Wendt, chairman, department of instructional materials. $42,232.

UNIVERSITY OF CHICAGO, Chicago: *Use of communications media to improve teaching*, 19 months, John O. Fritz, director, audiovisual center. $50,312.

LOYOLA UNIVERSITY, Chicago: *Improved methods of teaching dentistry by use of motion pictures*, 14 months, Peter B. Christensen, associate professor of prosthetic dentistry. $2,900.

UNIVERSITY OF MISSISSIPPI, University: *Use of visual aids by student governments*, 8 months, Frank R. Paine, director, department of educational film production. $30,267.

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles: *Experimental methods of film presentation—linear vs. nonlinear and logical vs. conceptual*, 18 months, William H. Allen, research associate. $35,172.

Commissioner Announces Modern Foreign Language Fellowships for 1960–61

U.S. Commissioner of Education L. G. Derthick has awarded National Defense modern foreign language fellowships to 474 graduate students for study during the 1960–61 academic year. Federal appropriations for the language fellowship program total $1,550,000.

The purpose of the language fellowships is to increase the number of college teachers of foreign languages seldom taught in the United States, and the number of persons trained in these languages for other areas of public service.

The fellows will study at 34 institutions of higher education. Of the 474 awards, 398 are for the full academic year and 76 are for study during the summer of 1960 only. Stipends range up to $2,700, plus tuition and fees. The fellow also receives travel and dependency allowances.

The Office of Education was guided in its selections by the recommendations of faculty committees appointed by graduate deans at the universities where graduate students submitted applications and by 10 eminent educators and linguists who reviewed the applications and made recommendations on rankings by languages.

Awards were made to 397 graduate students in 6 languages that have been designated by the Commissioner as requiring greatest emphasis in the light of our national needs. These are Russian (132 awards), Arabic (61), Hindi-Urdu (42), Chinese (66), Japanese (61), and Portuguese (35). In addition, 77 awards were made in 25 other languages spoken in all major geographical areas of the world.

Last year awards were made to 171 graduate students for study in the summer of 1959 and the 1959–60 academic year. Of these, 113 received second-year awards for continued study.

Students receiving awards are required to give reasonable assurance that upon completion of their graduate training they will either teach the language they are studying or will use their language competences in another public service field.

Graduate Fellowships Awarded for 1960–61

GRADUATE FELLOWSHIPS, authorized under Title IV of the National Defense Education Act, have been awarded for the 1960–61 academic year to 1,500 graduate students studying in 404 approved programs at 136 graduate schools. The Title IV fellowships are intended to assist graduate students preparing for college teaching, to increase facilities for the training of graduate students, and to encourage a better geographical balance of facilities throughout the country.

Of the 1,500 fellowships, 72 have been awarded to second-year graduate students and 8 to third-year graduate students. The remaining 1,420 fellowships are 3-year fellowships and have been awarded to students with no more than 6 months of graduate work in the field in which they applied for the fellowship.

Of the 1,000 graduate students awarded 3-year fellowships, for the 1959–60 academic year, 42 have had to resign their fellowships because of illness or

other personal reasons. The act authorizes the award of an additional 1,500 fellowships for the 1961–62 academic year and 1,500 fellowships for the 1962–63 academic year, or a total of 5,500 fellowships over a 4-year period.

Each fellow receives a stipend of $2,000 for the first year of study, $2,200 for the second year, and $2,400 for the third year, together with an allowance of $400 for each dependent. The graduate school the fellow attends receives up to $2,500 to help pay for the cost of his education.

The fellowship awards fall into five principal categories: Humanities (27%), social sciences (30%), education (7%), physical sciences (16%), engineering (10%), and biological sciences (10%).

$55 Million Loaned to College Students in One Year

As of February 29, 1960, a total of 124,320 National Defense student loans ($54,631,000) had been approved by the 1,360 participating colleges and universities since the student loan program began operations with its first allocation of funds on February 1, 1959. Up to February 29, these institutions had received $60.8 million in Federal capital contributions, and $265,000 in institutional loans has been made to colleges and universities unable to contribute the required $1 for every $9 of Federal money.

The 1,360 participating institutions have added $6.5 million of their own money to the loan funds, bringing the total loan fund to $67.5 million. Thus far 927 student borrowers have paid back $226,776 to the fund. These institutions have already committed all the loan funds they have on hand, for loans to students who are enrolled in this academic year or for students who are planning to study this summer or fall.

Middlebury College to Evaluate 1960 Summer Language Institutes

Middlebury College, Vt., will evaluate the 36 National Defense language institutes to be conducted next summer. Stephen A. Freeman, vice president of Middlebury and director of its summer language schools, will head a team of 15 people, all of them college and university language teachers. The team will make two 3-day visits to each institute except the Stanford University Institute, to be conducted in Germany, and to the University of Puerto Rico Institute. It will make one extended visit to each of these institutes.

When the institutes have concluded, the evaluators will pool their information at a conference in September, to be held at Middlebury College. From this conference will come two reports—a detailed report on each institute and a summary report for general information.

Purpose of the evaluation is to determine whether the institutes are being effectively conducted, to see how the institutes meet and solve their problems, and to gain information that will be useful in planning the summer institute program for 1961 when 55 institutes will be conducted. A similar evaluation was carried out by Middlebury College last summer and its success and usefulness led to the renewal of the project.

Congress Approves $9.7 Million Supplemental for Loan Funds

An additional $10.8 million has been allocated to colleges and universities participating in the National Defense student loan fund for use during the remainder of the current academic year. Of this amount $9.7 million was appropriated by Congress in a supplemental budget, and $1.2 million was made available from institutions that withdrew from the program or could not use the funds. About $110,500 of these funds is being reserved for loans to institutions which cannot contribute $1 for every $9 of Federal funds.

Of the supplemental funds available, $4.5 million has been allocated automatically to 695 institutions which did not receive 100 percent of their loan requests last July and whose needs for loan funds continue to be urgent. The remaining $6.3 million will be allocated to 576 institutions in 51 States and Puerto Rico that have requested an additional $11.9 million in loan funds. After these requests were reviewed by the student loan consultant panel they were adjusted downward to $7.1 million. The funds have been allocated proportionately within each State. A total of $39.8 million has been made available for student loan funds during fiscal year 1960 and a total of $70.3 million since February 1959, when the first loan allocation was made under NDEA.

Other Program Notes

NSF Announces Institute Program

THE NATIONAL SCIENCE FOUNDATION announced on May 2 the awarding of 13 grants totaling approximately $74,000 for continuation of a pilot program of inservice institutes for elementary school teachers and supervisors of science and mathematics. This program should help improve the quality of science and mathematics instruction in the elementary grades. Now entering its second year, the program is based on the Foundation's belief that sound instruction in basic science and arithmetic is important at the elementary level as the basis for high quality secondary school education.

The 13 colleges and universities to be supported in 1960–61 will provide special courses enabling teachers and supervisors to learn about recent significant scientific advances and to supplement their earlier training in science and mathematics.

Approximately 400 participants will receive travel and book allowances and will have tuition and fees paid. They will be able to attend institute classes scheduled outside regular school hours so that they may still teach full time. A typical institute meets once a week for 3 hours for the full academic year of 30 weeks.

Participants will be chosen by the institutes, *not* by the National Science Foundation. Requests for application forms and inquiries concerning specific courses offered should be addressed to the directors of the individual institutes named in the list below, which also indicates the broad areas of training available at each institute.

ARIZONA. The University of Arizona, Tucson; Arthur W. Steinbrenner, department of mathematics. Biological sciences, mathematics, physical sciences.

CALIFORNIA. San Jose State College, San Jose; John L. Marks, department of mathematics. Mathematics.

CONNECTICUT. Saint Joseph College, West Hartford 17; Sister Maria Clare Markham, chairman, department of chemistry. General science.

ILLINOIS. Northern Illinois University, DeKalb; Eugene W. Hellmich, head, department of mathematics. Mathematics.

Northwestern University, Evanston; E. H. C. Hildebrandt, professor, department of mathematics. Mathematics.

IOWA. Iowa State Teachers College, Cedar Falls; E. Glenadine Gibb, department of mathematics. Mathematics.

KANSAS. Kansas State Teachers College, Emporia; Ted F. Andrews, head, department of biology. Biology.

MINNESOTA. Bemidji State College, Bemidji; Richard E. Beitzel, professor, department of chemistry. Physical sciences.

NEW YORK. American Museum-Hayden Planetarium, New York 24; Franklyn M. Branley, associate astronomer. Astronomy, space science.

OREGON. Oregon State College, Corvallis; Albert L. Leeland, School of Education. Biology, earth sciences, general science.

PENNSYLVANIA. Millersville State College, Millersville; William B. McIlwaine, professor, department of science. Earth sciences, mathematics.

TEXAS. East Texas State College, Commerce; Roy N. Jervis, director, division of earth sciences. Earth sciences, physical sciences.

Texas Woman's University, Denton; Dixie Young, director, department of biology. Biological sciences, mathematics, physical sciences.

Grants for Research Abroad

TWELVE new grants for research to be done abroad have been announced by the U.S. Department of Agriculture. The 12 grants were awarded to institu-

tions in 5 countries for research in specific fields, as listed below:

FINLAND: 3 grants totaling $172,183, for research in bacteriology.

SPAIN: 5 grants totaling $163,146, for research in methods of improving cotton yarns for weaving and in techniques of converting farm-produced raw materials to industrial and consumer products. One of these projects is a 5-year program for the isolation and study of the characteristics of yeasts. The results will be placed in the culture collection of the USDA's Agricultural Research Service.

ITALY: 2 grants totaling $116,920, for projects in microbiology.

ISRAEL: 1 grant totaling $112,278, for the improvement and increased utilization of cereals.

UNITED KINGDOM: 1 grant totaling $61,505, for the improvement and increased utilization of cereals.

Foreign research of the U.S. Department of Agriculture is paid for with foreign currencies accruing to the account of the United States from the sale of surplus agricultural commodities under Public Law 480 (the Agricultural Trade Development and Assistance Act of 1954). These programs are planned to improve the world agricultural economy.

Conference of Engineering Societies

HENRY H. ARMSBY of the Division of Higher Education will attend a meeting, May 28–June 3, at The Hague in Holland of the Conference of Engineering Societies of Western Europe and the United States of America as a member of one of the working parties of the Committee on Engineering Education and Training. Dr. Armsby is one of the three delegates named by the engineering societies of the United States; he will also serve as an official observer for the Office of Education.

The committee expects to publish what may be described as a "handbook" of engineering education in 20 nations. The publication as planned should be of great value to university officials, engineering societies, and State boards of engineering registration, for it will contain comparative information on the education of engineers, provisions for their professional development, and recognition granted to engineers on completion of their formal educational programs.

NEW PUBLICATIONS

Government Publications

How To Obtain

(1) Cost Publications: Send request, enclosing remittance (check or money order), to the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

(2) Free Publications: Request direct from the agency issuing them.

From the Office of Education

Analysis of Research in the Teaching of Mathematics 1957 and 1958, by Kenneth E. Brown *and* John J. Kinsella. Washington, U.S. Government Printing Office, 1960. Paper, 50 p. 25 cents. (OE–29007.)

This booklet shows findings of research in the teaching of college, high school, and elementary school mathematics in the years 1957 and 1958. On the college level, 23 studies are analyzed. They concentrate on the preparation and competence of elementary and secondary school teachers of mathematics and the use of television in teaching mathematics. Also included are studies on predicting success in college mathematics.

Education Directory 1959–1960, Part 4: Education Associations, by Bobbie Doud. Washington, U.S. Government Printing Office, 1960. Paper, 128 p. 50 cents. (OE–10001.)

Higher Education Planning and Management Data, 1959–60, by W. Robert Bokelman. Washington, U.S. Government Printing Office, 1960. Paper, 104 p. 70 cents. (OE–53004.)

Report is the third of an annual series of Office of Education publications on higher education salary, tuition and fees, and room and board data, part of a study to provide normative data useful in budget making and other planning activities of college and university administrators. The 1960 volume consists of tabular presentations; it will be followed by a report that will provide more detailed data analysis and will include comparisons of changes made during the past 3 years. The tables permit analyses on four bases: By control, by geographic region, by type of institution, and by size of enrollment.

Mathematics and Your Career, Revised 1960. Washington, U.S. Government Printing Office, 1960. Paper, 9 p. (U.S. Department of Labor, Bureau of Labor Statistics, in cooperation with U. S. Department of Health, Education, and Welfare, Office of Education.)

Lists occupations requiring mathematical training and the level of the training (i.e., high school or vocational school mathematics, post-high-school training in applied mathematics, some college mathematics, or extensive college mathematics). Contains references to pages in the *Occupational Outlook Handbook.*

The National Defense Graduate Fellowship Program, Revised 1960. Washington, U.S. Government Printing Office, 1960. Leaflet, 5 p.

Explains certain aspects of the National Defense Graduate Fellowship Program, such as its origin and purpose, requirements for approval of programs and for eligibility, amounts of awards, financial aid part-time work, and grants to institutions.

The National Defense Language Institute Program, Announcement for 1960-61. Washington, U.S. Government Printing Office, 1960. Processed, 12 p. (OE–27002.)

Announcement of summer institutes in 1960 and academic-year institutes in 1960–61 for teachers, or supervisors or trainers of teachers, of modern foreign languages in elementary and secondary schools. Includes statements on origin and purpose, eligibility, criteria for admission, program of study, stipends, application forms, and participating institutions, 1960–61.

Teacher Education in the Netherlands, Belgium, Luxembourg, By George A. Male. Washington, U.S. Government Printing Office, 1960. Paper, 190 p. 70 cents. (Bulletin 1960, No. 4.)

Book describes basic information on teacher education in the Netherlands, Belgium, and Luxembourg, with a separate examination of each country's school system from nursery school to institutions of higher education; curriculum and examinations for nursery school, kindergarten, elementary, and secondary school teachers; and the teaching profession itself, including working conditions, salary, supply and demand, inservice education, and research.

Transfers to Schools or Colleges of Engineering 1951, 1952, 1953, and 1959, by Henry H. Armsby. Washington, U.S. Government Printing Office, 1960. Processed, 7 p. (OE–54005.)

Presents results of fourth study of transfers to schools or colleges of engineering from non-engineering curriculums, under the auspices of the American Society for Engineering Education and the U.S. Office of Education. Comparison of 1959 figures with those of earlier years indicates that the increase in transfer students has been a contributing factor in the decline in freshman engineering enrollments.

Other Government Agencies

Reviews of Data on Research and Development. April issue, "Funds for Research and Development in Colleges and Universities, Fiscal Year 1958: A Preliminary Report." Washington, U.S. Government Printing Office, 1960. Processed, 7 p. 10 cents. (National Science Foundation, NSF 60–21.)

Nongovernment Publications

Obtain direct from the publisher. Prices are indicated when known

First Annual Phi Delta Kappa Symposium on Educational Research, edited by Frank W. Banghart. 8th and Union, Bloomington, Indiana, Publications Division of Phi Delta Kappa International, 1960. 128 p. $2.

Presents results of symposium on important aspects of current educational research—its stage of development, its rationale, its underlying assumptions, its philosophy, and its relationship to research in other behavioral sciences.

Plain Talk from a Campus, by John A. Perkins (former Under Secretary of Health, Education, and Welfare). 59 East 54th Street, New York 22, N.Y., University Publishers, Inc., 1959. 195 p. $4.

Standardized Tests for Use in Connection with the National Defense Education Act of 1958. 432 Park Avenue South, New York 16, N.Y., The American Textbook Publishers Institute, 1960. Processed, 8 p.

Lists more than 400 standardized tests available to schools for use in programs of testing, guidance, and counseling in connection with the NDEA of 1958. Tests listed pertain to the areas of achievement, character and personality, English, fine arts, foreign languages, intelligence, mathematics, aptitudes, reading, sciences, perception, social studies, and vocations.

Student Financial Aid: Manual for Colleges and Universities, by Homer D. Babbidge, Jr. 1605 New Hampshire Avenue NW., Washington 9, D.C., American College Personnel Association, 1960. Paper, 56 p. $1.50. (Student Personnel Series No. 1.)

Purpose of the publication is to assist institutions of higher education in developing and administering programs of financial aid for students. It deals with basic concepts underlying financial assistance, measuring student need, gift scholarships, loan assistance, student employment, noninstitutional and miscellaneous forms of aid, and effective administration.

The Uniform on the Campus. 2121 Tuttle Park Place, Columbus 10, Ohio, OSU-AFROTC Civilian Instructor Program, Department of Air Science, The Ohio State University, 1960. Paper, 42 p.

This final report of the Ohio State University-Air Force ROTC Civilian Instructor Program, extending from fall 1955 to the present, concisely summarizes the recommendations and conclusions of previous reports that were distributed on a limited basis. It deals with the origin, organization, and operation of the OSU-AFROTC Civilian Instructor Program; factors leading to and objectives and results of the exploratory program; specific recommendations relative to the AFROTC program and implications for the ROTC in general.

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